REMARKS

This paper is being submitted in response to the Office Action mailed March 7, 2010. Claims 1–7 and 9-20 are currently pending. Claims 2 and 11 have been amended. Claims 14–20 were previously withdrawn by the Examiner as being directed to a non-elected invention. No new matter is introduced by this Amendment.

Claim Objections

Claims 2 and 11 were objected to under 37 CFR 1.75(c) as being improper dependent claims. Claim 2 has been amended to replace "may be added" with "are added". Claim 11 has been amended to incorporate the features from claim 10 and no longer depends from claim 10. Claims 2 and 11 as amended comply with the requirements of 37 CFR 1.75(c). Withdrawal of the objection is requested.

Rejection under 35 U.S.C. § 103

1. Claims 1-7 and 9, 10, 12, and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haas (Surface and Coatings Technology, 1999, 111:72-79) in view of Linden (WO03/066933) in view of Goodwin (WO03/086031). Applicants respectfully traverse this rejection.

To make a *prima facie* case of obviousness, all the limitations of the claims must be taught or suggested in the references cited by the Examiner and all the teachings of the prior art need to suggest the claimed subject matter to the person of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000). As articulated by the Supreme Court, a combination is obvious if it is no more than the predictable use of known elements according to their established functions; and <u>there is a reason</u> to combine the known elements. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). "[I]t remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." *Id.* Applicants submit that the Office Action has not established the required *prima facie* case, as the cited references, either alone or in combination, do not teach or suggest all the claim limitations

and the Office Action has failed to establish that one of skill in the art in view of the cited combination of references had a reasonable expectation of successfully arriving at Applicants' claims.

Claim 1 recites a method for coating a substrate with an inorganic-organic hybrid polymer material using the Dielectric Barrier Discharge (DBD) technique. The method includes steps of introducing a sample in the space between two electrodes, controlling the atmosphere between the electrodes, generating a plasma discharge between the electrodes, and mixing aerosols containing hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing, into the plasma discharge.

The Office Action alleges Haas discloses the vapor phase coating of ORMOCER® layers. Applicants do not agree.

Haas discloses the combination of ORMOCER® layers with vapor deposited inorganic thin films (e.g. SiO_x). See Abstract and right column of page 72, second paragraph. Haas discloses the coating of vapor-deposited inorganic thin films (e.g. SiO_x) with ORMOCER® layers applied by wet chemical processing to form inorganic thin films. The use of ORMOCER®'s as top layers of SiO_x-coated OPP and their influence on the oxygen permeability is shown in Fig. 8.

In Haas, vapor-deposited inorganic thin films (e.g. SiO_x) are coated with ORMOCER® lacquer using conventional coating techniques, such as dip-coating, spray-coating, and spin-coating, and can be cured by heating (typically 1 hour at 130 °C) or UV irradiation. See Abstract and left column of page 75, second paragraph. Haas does not disclose or suggest coating vapor deposited inorganic thin films (e.g. SiO_x) with ORMOCER® using a vapor deposition process. Only conventional coating techniques, such as dip-coating, spray-coating, and spin-coating, are disclosed with respect to the ORMOCER® layers.

The secondary Linden reference does not cure the deficiencies of the primary Haas reference. Linden provides for the deposition of a coating comprising an inorganic and an organic component, in which the inorganic component comprises nanoparticles. These nanoparticles are formed through substantially complete dissociation of the inorganic precursors as disclosed at page 6, line 15, to page 7, line 7:

> For the formation of the nanoparticles, preferably a part of the inorganic component is deposited in the form of nanoparticles. These nanoparticles are formed through substantially complete dissociation of the inorganic precursors, such as, for instance, the metal or silicon alkoxydes, and condensation of activated molecules to virtually crystalline nanoparticles. Once captured and covalently bound, or not, in the hybrid coating, these nanoparticles offer the advantage that they impart very high scratch resistance to the hybrid coating. Preferably, in an embodiment according to the present invention, nanoparticles are formed having a diameter between 1 and 200 nm. With greater preference, the nanoparticles possess a diameter between 1 and 50 nm.
>
> When an organic molecule is introduced into a plasma, the monomer draws energy from the plasma through non-elastic impacts and it is activated and fragmented into activated smaller molecules. The activated monomers combine with each other, thereby forming larger molecules, eventually resulting in a polymer. Because the plasma will fragment most organic compounds, plasma polymers can be deposited from virtually any organic monomer. Plasma polymers are in most cases highly branched and crosslinked, in most cases they are insoluble and adhere to solid surfaces.

Linden defines a plasma source to mean an electric power source and the electrodes for generating an electric field as well as the space limited by this field, for discharge and activation of a gaseous or vaporous composition at page 10, lines 6-10:

> In a wider sense, plasma source in the present invention is understood to mean an electric power source and the electrodes for generating an electric field as well as the space limited by this field, for discharge and activation of a gaseous or vaporous composition of constituents and any physical separation present.

Linden does not disclose or suggest a dielectric barrier between the two electrodes and hence does not disclose or suggest a dielectric barrier discharge configuration. Moreover, the process in Linden is clearly a chemical vapour deposition process as is stated at page 2, lines 20 to 27:

> The present invention relates to a method for applying a hybrid coating to a substrate, which coating comprises an inorganic and an organic component and which inorganic component comprises nanoparticles, wherein precursors for these components are activated in one or more plasma sources for plasma activated deposition of a chemical vapor phase and wherein the activated precursors are combined before they are deposited on the substrate from the chemical vapor phase for forming the coating.

The term "chemical vapour deposition" is not specifically defined in Linden, but according to the McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition, McGraw-Hill, New York (2002) it is the growth of a thin film on a crystalline substrate as a result of thermochemical

vapor phase reactions (copy of dictionary page 376 enclosed). Furthermore, Linden fails to disclose or suggest aerosols containing hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing.

Therefore, Linden discloses a chemical vapour deposition process in which the inorganic precursors are completely dissociated and form nanoparticles in the plasma. Linden discloses a chemical vapour deposition process, rather than a Dielectric Barrier Discharge (DBD) technique as recited in claim 1, by injecting inorganic precursors, rather than aerosols containing hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing as recited in claim 1.

With respect to Linden, the Office Action at page 4 asserts Linden is directed to making inorganic-organic hybrid polymer material coatings (ORMOCER®s). Applicants submit Linden is not referring to the trade name ORMOCER®, which can only be generated by a proprietary process owned by Fraunhofer in which the prepolymers are provided in an aqueous lacquer, but to "Orcomer" which is defined in Linden in the generic sense as meaning "[h]ybrid materials...built up from a large variety of inorganic and organic components which are chemically bonded to each other at a molecular level". See Linden at page 4, limes 8-13.

Neither Haas nor Linden discloses or suggest vapour phase coating of ORMOCER® layers. As discussed above, Linden discloses a chemical vapour deposition process in which the inorganic precursors are completely dissociated and form nanoparticles in the plasma, i.e. are not present in the deposited layers.

The secondary Goodwin reference does not cure the deficiencies of Haas and/or Linden. Goodwin discloses an atmospheric pressure plasma assembly and methods for treating a substrate using the disclosed assembly (see generally Goodwin at paragraph [0011]). The assembly includes a first and second pair of vertically arrayed, parallel spaced-apart planar electrodes with at least one dielectric plate between said first pair, adjacent one electrode and at least one dielectric plate between said second pair adjacent one electrode. The spacing between the dielectric plate and the other dielectric plate or electrode of each of the first and second pairs of electrodes forms a first and second plasma region. The assembly further includes a means of transporting a substrate successively through said first and second plasma regions and an atomizer adapted to introduce an atomized liquid or solid coating making material into one of

said first or second plasma regions (see Goodwin at paragraph [0019]). Goodwin is silent with respect of the thickness of the layers produced.

Goodwin discloses an extensive list of monomeric or oligomeric materials that can be atomized in the disclosed methods. See Goodwin at paragraphs [0039] and [0040]. Therefore, Goodwin discloses an atmospheric DBD plasma process in which liquid droplets produced by atomizing a liquid and/or a solid is introduced into an atmospheric DBD plasma which contemplates that the atomized liquid is monomers, oliogomers, metal alkoxides, metals, metal oxides or conducting polymers. Goodwin does not disclose or suggest injection of hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing into DBD plasma or vapor phase coating of ORMOCER® layers.

A rejection cannot be predicated on the mere identification of individual components of the claimed invention. Rather, particular findings must be made as to the reason the skilled artisan, with no known knowledge of the claimed invention, would have selected these components for combination in the manner claimed." *Ecolochem Inc. v. Southern Calif. Edison Co.*, 227 F.3d 1361, 1375 (Fed. Cir. 2000).

Absent Applicants' disclosure, one of skill in the art would not have been reasonably motivated to use a DBD process as taught in Goodwin in the process of Haas in view of Linden. Haas only discloses the provision of ORMOCER® layers by conventional coating processes such as dip-coating, spray-coating and spin-coating. Linden does not disclose ORMOCER® layers, and any inorganic precursors present in the plasma in Linden are completely dissociated and form nanoparticles in the plasma, i.e. are not present in the deposited layers. Goodwin also fails to disclose ORMOCER® layers, and discloses an atmospheric DBD plasma process in which liquid droplets produced by atomizing a liquid and/or a solid is introduced into an atmospheric DBD plasma which contemplates that the atomized liquid is monomers, oligomers, metal alkoxides, metals, metal oxides or conducting polymers. None of the references, alone or in combination, disclose or suggest vapor phase coating of ORMOCER® layers.

Claims 2-7, 9, 10, 12, and 13 depend directly or indirectly from claim 1 and are therefore patentable over the combination of Haas, Linden, and Goodwin for the same reasons as claim 1.

In view of the forgoing, Applicants submit the Office Action has failed to establish a *prima facie* case of obviousness because (1) the Office Action does not establish that one of skill in the art in view of the cited combination of references had a reasonable expectation of successfully arriving at Applicants' claims and (2) the cited combination of references fails to disclose or suggest all the elements of the claims. Withdrawal of the rejection is respectfully requested.

2. Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Haas in view of Linden in view of Goodwin in further view of Chow (U.S. 200202031658). Applicants respectfully traverse this rejection.

Claim 3 depends from claim 1. Claim 1 is patentable over the combination of Haas, Linden, and Goodwin for the reasons discussed above, The Chow reference does not cure the deficiencies of the combination of Haas, Linden, and Goodwin.

Chow describes spray deposition of liquid precursor coating material onto a substrate (see Chow, for example, at paragraph [0013]). Similar to Haas, Linden, and Goodwin, the Chow references does not disclose or suggest vapor phase coating of ORMOCER® layers. The cited combination of references therefore fails to disclose or suggest all the elements of claim 1 or claim 3.

Withdrawal of the rejection is respectfully requested.

SUMMARY

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers or any future reply, if appropriate. Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725.

Respectfully submitted,

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